TWO AGGREGATIONS OF *CALOSOMA FRIGIDUM* (COLEOPTERA: CARABIDAE) IN ONTARIO DURING 1976[1]

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ABSTRACT: Two aggregations of the carabid, *Calosoma frigidum* Kirby, are described from Ontario. Large populations in Algonquin Park during June 1976 occurred concurrently with large populations of a prey species, *Operophtera bruceata* (Hulst).[3] Observations about movements of the beetles within areas of high density are presented, and a high degree of flight activity was particularly significant. The second aggregation involved a mass flight of *C. frigidum*, and evidence is provided which suggests that meteorological factors were partly responsible for the flight.

The Frigid Calosoma (*Calosoma frigidum* Kirby) is a large ground beetle of wooded habitats (Gidaspow 1959). It is widespread throughout southern Canada and the United States, occurring from Newfoundland to British Columbia, and south to Georgia and Texas (Burgess and Collins 1917, Gidaspow 1959). In spite of the wide range occupied by this species, little has been written regarding its movements or other aspects of its natural history. This is surprising in light of the fact that this species, and members of the genus *Calosoma* in general, are voracious predators of the larvae and pupae of many forest Lepidoptera and, as such, are potentially important as biological control agents. Poulin and O'Neil (1969) have shown that *C. frigidum* may be an important predator of the introduced pestiferous slug, *Arion ater* (L.).

The present note describes some of the features related to two separate aggregations of *C. frigidum* in Ontario. The first involves an apparent close relationship with a concurrent outbreak of a prey species; the second is related to mass migration (cf. Johnson 1969).

1. The Algonquin Park Aggregation

During the period of 4-12 June 1976, large numbers of *C. frigidum* were observed in woodlands in Peck and Canisbay Townships, Algonquin Provincial Park, Nipissing District, Ontario. The forests in which they were found were generally dry mesic, sugar maple (*Acer saccharum* Marsh.)-dominated woodlands over thin, loamy soils. These forests were being

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[3](Lepidoptera: Geometridae)

defoliated by large populations of the Bruce Spanworm (*Operophtera bruceata* (Hulst)). The beetles were observed only once in forests not fitting the above description, and it seems likely that the abundant food source available in the maple forests influenced the distribution of beetles within the stands. In Alberta, *C. frigidum* also seems to be restricted to mature forest stands (Dr. H. Goulet, pers. comm. 1978).

In Algonquin Park, many adult beetles were observed carrying *O. bruceata* larvae in their mandibles. Although much of the foraging activity occurred on the litter layer of the forest floor, many adult beetles were observed climbing the trunks of trees and foraging on the branches and foliage at heights of 7 meters or more above the forest floor. They were also observed to fly from place to place beneath the canopy quite frequently. It is interesting to note that Dr. Goulet (pers. comm. 1978) observed flight only once during five summers of study in Alberta. It is possible that flight activity is related to the type of prey being exploited. If a large number of prey can be obtained on the ground, the need for flight is greatly reduced. This could be so when cutworms (Lepidoptera:Noctuidae) serve as a food source for *C. frigidum,* as in some of the Alberta studies. *O. bruceata* larvae are most abundant in the canopy levels in hardwood forests. Thus, although some larvae were on the forest floor, a far larger pool of food was available at higher levels in the forests in Algonquin Park, and this may account for the high degree of flight activity observed there.

The beetles were no longer present after 12 June, presumably having become dormant. Goulet (pers. comm. 1979) found that all adults had become dormant by 15-20 June in his Alberta studies.

During the latter part of May and early June 1977, *C. frigidum* was again common in the same hardwood forests in Algonquin Park, but *O. bruceata* had almost disappeared. It is possible that *C. frigidum* was partly responsible for this rapid decline.

2. The Lake Erie Aggregation

At approximately the same time as the Algonquin Park aggregation discussed above, another, more spectacular aggregation occurred along the north shore of Lake Erie in Elgin County, Ontario. An anonymous collector provided the following note, which is located with a series of specimens, in the collection of the Department of Environmental Biology, University of Guelph.

> "This species of *Calosoma* (i.e., *frigidum*) was found in excessive numbers in Iroquois Beach Provincial Park on or about June 15, 1976. Specimens were first reported climbing on swimmers. Observers reported that there were 'hundreds of thousands' of beetles in the water, on the beach and 'were 5 beetles deep on the supports of the boat pier'."

In all likelihood, this represents an example of a sudden mass flight, as discussed by Johnson (1969). This type of flight is thought to be influenced by meteorological factors. Six meteorological criteria for mass flights were reviewed by Johnson (1969, p. 287). These are:

1. The maximum temperatue on the day of the flight must equal or exceed 20°C.
2. The average temperature must be greater than that of the previous day.
3. There can be no precipitation on the day of the flight.
4. There must be at least one hour of sunshine on the day of the flight.
5. The dew-point must be between 5°C and 15°C.
6. The atmosphere must be stable above approximately 5000 feet (ca. 1500 meters).

An analysis of weather maps for the week preceding the flight indicates that a front was beginning to move into the Great Lakes region on 11 June. This front became occluded just west of Lake Superior on 12 June, and by 13 June, the occlusion was centered over the lower Great Lakes. Violent weather, in the form of tornadoes, torrential rains, and hailstorms, was associated with this system from Chicago to Toronto (Atmospheric Environment Service 1976, Taubensee 1976). On 14 June, the front passed, and the lower Great Lakes region was situated in the warm sector. Taubensee (1976) also points out that the average temperatures from 7-20 June were several degrees (°F) above normal. Thus, although data for all six criteria are not at hand, it is apparent that at least three or four of the criteria are fulfilled, and this circumstantial evidence suggests that the *C. frigidum* flight might well have been influenced by meteorological factors. Johnson (1969) suggested that mass flights actually form part of a continuous event that remains unnoticed until special weather conditions cause a mass exodus or concentrate insects that are already flying into lower levels of the atmosphere. This may be true for some insect groups, but mass flights have never before been documented for *C. frigidum,* and only one report describes a possible mass flight in the genus *Calosoma* (Doane and Schaefer 1971, for *C. sycophanta* (L.)). Those authors also commented on the rarity of the event.

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INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

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The Commission hereby gives six months' notice of the possible use of its plenary powers in the following cases, published in *Bull. zool. Nom.* Volume 37, part 2, on 19th June 1980, and would welcome comments and advice on them from interested zoologists. Correspondence should be addressed to the Secretary at the above address, if possible within six months of the date of publication of this notice.

1175 *Heterelis* Costa, 1887 (Insecta, Hymenoptera): proposed procedure for concluding the case.

2048 *Leptinotarsa* Chevrolat, 1837 (Insecta, Coleoptera): revised proposals for conservation.

The following cases were published in *Bull. zool. Nom.* Volume 37, part 3, on 25th September 1980.

2138 *Sphinx tipuliformis* Clerck, 1759 (Insecta, Lepidoptera), proposed conservation.

2139 *Sesia andrenaeformis* Laspeyres, 1801 (Insecta, Lepidoptera), proposed conservation.

2149 *Chermes fusca* Zetterstedt, 1828 (Insecta, Homoptera) a secondary homonym in *Psylla* Geoffroy, 1762: proposed validation.

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